CCS News Bytes

LALP-06-059 **April-May 2006**

CCS staff members listen intently to division presentations before the Division Review Committee.

DRC Gives CCS high marks in last UC review

On May 4, after three days of intense technical discussion, Daniel A. Reed, chairman of the 2006 Division Review Committee (DRC) for the Computer and Computational Sciences Division (CCS), closed on a bittersweet note.

He pointed out that because of the coming change in management at Los Alamos National Laboratory (LANL), this year marked "our swan song as review team," and he added a compliment: "Overall," he said, "we think—as we have in the past—that CCS is doing a great job … Keep up the good work … CCS has been a continuing success … We are delighted to have been a part of this."

The Grade…

CCS Division Leader Bill Feiereisen said later that the DRC gave CCS a grade of "Outstanding/Excellent." He described the grade as an "A-minus/B-plus."

The review team also provided a statement of the "organizational peers" with which it compared CCS, listing "other Department of Energy (DOE) laboratories" such as Lawrence Livermore National Laboratory, Oak Ridge National Laboratory, and Argonne National Laboratory, and "corporate research divisions" such as those at IBM and Microsoft.

Institutional Concerns

Although the DRC was obviously impressed with CCS, the team still had some concerns—several of which were directed more to Laboratory management than to CCS itself.

Reed said LANL must diversify its portfolio—and computing and computational science are "principal diversification strengths." CCS "plays a multifaceted role," he said. It is a "window to the computing community" that has a "long-term focus on new algorithms and problems" and is "solving hard problems at scale." The Laboratory management must "grow and market this capability," he concluded.

"We have substantive concerns about the new organization," Reed said, adding, "We recommend reconsideration at the highest level." He urged the incoming administration to ask itself, "'What will the Laboratory be when weapons are a small part of the budget?'"

Reed said, "Management must support and maintain long-term capabilities," and he added, "New funding sources and long-term investment are required." He specifically mentioned threat reduction and other new initiatives, stating that the Laboratory will need "significant external funding analogous to Weapons Supported Research (WSR)."

"The Laboratory must market itself to other agencies," he said. "This is a senior management responsibility of major importance. Overhead must be adjusted to make this possible/viable."

(Please see DRC on page 3.)

Division donates $150K to scholarships, institute

A division at Los Alamos National Laboratory (LANL) has found a creative way to invest in the future of U.S. science.

The Computer and Computational Sciences Division (CCS) has designated $150,000 from its royalties fund for scholarships and teacher training.

(Please see Donations on page 2.)

Donations (Cont'd from p.1)

- CCS donated $20,000 for three scholarships awarded at the National American Indian Science and Engineering Fair (NAISEF) in Albuquerque in March.
- The division contributed $80,000 of the $92,900 in scholarships awarded April 25 at the New Mexico Supercomputing Challenge held at the Laboratory.
- And CCS will provide $50,000 to sponsor the Summer Teacher Institute to be held at Santa Fe Indian School July 17-28 to train teachers who will be a key part of next year's Supercomputing Challenge.

Gina Fisk, the student liaison for CCS, said the donations are intended to encourage bright young computer science students, develop outstanding science teachers, and benefit "science as a whole."

Under LANL policies, when division scientists receive royalties on patented work done at the Laboratory, 35% of the money goes to the scientist, 35% goes to the scientist's division, and 30% goes to the Laboratory. A division's royalty money can only be used for educational purposes or for research that isn't funded by another donor.

Over the last five years, CCS royalty money had built up to more than $300,000. This year, the division is plowing the money back into science.

At the request of CCS Deputy Division Leader Stephen Lee, Fisk developed a plan for educational spending. She and Lee met to refine the proposal, and it is now in effect. Lee said the donations are "an investment in the future for computational science, for the Laboratory, and for the nation."

On March 25, at NAISEF, Fisk awarded a $10,000 scholarship to Hannah Woriax, a senior at Purnell Swett High School in Pembroke, North Carolina; a $5,000 scholarship to Alyssa Bullard, a junior at Purnell Swett; and a $5,000 scholarship to Natasha Gail from Rough Rock High School on the Navajo Reservation in Arizona.

Fisk said that tribal elders attended the fair and were "very appreciative of the awards."

Woriax did a study on how to kill bacteria without using antibiotics, producing a time-lapse video showing how garlic, sage, and other herbs affected bacteria over time. Woriax plans to go to the University of North Carolina and earn a degree in biology or pre-medicine.

Bullard did a study of deforestation in North Carolina, determining that when trees are cut down, more ammonia contaminates ground water. Bullard plans to go to Duke University and study some field of science.

Gail did a study on what causes errors in Global Positioning System (GPS) readings. She took readings on a perfectly flat football field, recorded results that erroneously indicated a bumpy surface, and then worked out mathematical corrections to the problem. Next, she repeated the process on a hill. She plans to attend St. John's College in Santa Fe and major in oceanography.

One month later, on April 25, Fisk stood on another stage and handed out seven scholarships at the Supercomputing Challenge. This time, the award ceremony brought back memories. "I was in the Challenge in 1992," she said. "I was on one of the winning teams." Two years later, in 1994, she went to work for the Laboratory.

Fisk was a finalist judge at this year's Challenge. She got to talk to all of the students in the final round of competition. "It's great to be able to help the students out," she said. "A lot of them were really excited about their scholarships."

The scholarships donated by CCS were as follows:

- $40,000 ($10,000 renewable for four years) to Samantha Stutz from Los Alamos High School, who did wildfire behavior modeling in Acid Canyon in Los Alamos County. Her ongoing study seeks to determine whether tree-thinning will really reduce the threat of crown fires in the forest. She plans to attend the University of Wyoming and continue her work in biological computing. Fisk commented, "The judges said she was simply outstanding and is definitely Ph.D. material."
- $10,000 to Nicholas Kutac of Rio Rancho High School, who worked on a team that modeled fire spread as a function of fuel types. He plans to go to New Mexico State University and major in mathematics.
- $10,000 to Stephanie McAllister of Manzano High School in Albuquerque, who worked with a team from Eldorado High School (also in Albuquerque) on a statistical analysis of the comparative speeds of parallel computer codes. She plans to go to New Mexico Institute of Mining and Technology (New Mexico Tech) and major in computer science.
- $5,000 to Matthew Paiz from St. Pius High School in Albuquerque, who also plans to go to New Mexico Tech and major in computer science.
- $5,000 to Ryan Loyd from St. Pius, a third student who plans to go to New Mexico Tech and major in computer science.
- $5,000 to Mark Wunsch from St. Pius, who plans to major in computer science at the University of New Mexico.
- And $5,000 to Jane Kim from Oñate High School in Las Cruces, who plans to go to Duke University and major in science.

In all, Fisk noted, CCS has awarded $100,000 to 10 high school students from around the country. Six of them plan to attend universities in New Mexico. Sixty percent of the recipients are women, and 40% of them come from minority groups. A total of 40% of them plan to major in computer science; 10% plan to study mathematics; and the other 50% will major in some other branch of science.

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DRC (Cont'd from p.1)

"Organization Issues: The 'Modified Matrix'"

Turning to potential organizational problems under the new management, Reed noted that CCS and the Applied Physics Division (X Division) must work even more closely together in the years to come—but the new organizational chart separates them.

He said the new "modified matrix management" organization "separates science, mission, and operation," and "there is no stable and stabilizing funding for science." He added, "If LANL is to maintain its unique character as a science-driven lab, it must maintain a deep skill and knowledge base."

He said the new structure combines the Theoretical Division (T Division) with CS Division (the new CCS Division) and "offspring" of the Computing, Communications, and Networking Division (CCN)—CTN and HPC Divisions—creating a promising focus on science-based prediction and engineering, but risking the separation of weapons design work.

In addition, he said, "Other program managers are expected to make appropriate long-term investments in capability and science for their missions. Experience suggests that short-term needs often starve the longer-term. If disrupted, long-term plans are hard to reinstate."

"Topics of Enduring Concern"

Reed noted that several of the team's comments had been expressed before.

He spoke of computing as "a strategic process—peer to theory and experiment."

He mentioned the need for a unified space for CCS, which continues to have staff members assigned in 10 different buildings. (Feiereisen mentioned Laboratory plans for an 85,000-square-foot new science building west of the Research Center that should be able to house CCS in a more compact configuration and might be in place by 2008.)

Reed also expressed concerns about unstable staffing. (The division overview showed that CCS has experienced a net loss of 17 technical staff members, one technician, and two organizational support/administrative specialist personnel since the last Division Review.) Reed said that matrix management is hard on morale; the Laboratory should "remove uncertainty" and solve problems affecting morale; CCS must create capabilities in the academic community that can feed into its programs; and the Laboratory must address issues of concern in recruiting foreign nationals.

He spoke of the importance of "external research interactions and mechanisms" including "funding overhead," "off-laboratory facilities," and "university partnerships."

And he insisted, "Computing must be represented by a principal associate director" because it is "a fundamental strength and a key capability." An advisor without authority or a division buried deep in the organizational chart will not have the long-term impact needed, he said.

CCS Division Leader Bill Feiereisen presents his overview to the DRC.

The Division's Formal Presentation

In open sessions on the first day of the review (May 2), Feiereisen, Deputy Division Leader Stephen Lee, and their employees provided the review team with a briefing book that included an extensive division profile.

Feiereisen also gave an overview of the division and its activities. Opening with the rhetorical question "Where is CCS going in science?" he said: "CCS Division is at the center of most of the scientific endeavors at the Laboratory. The division strives to be a virtual division, working in particularly tight and meaningful partnerships with other divisions. We enable scientific discovery and ensure that other divisions solve their key problems quickly and accurately. Their success is our success."

He listed three "strategic thrusts" in CCS: algorithms, methods, and codes; tools, software, and information management; and advanced hardware architectures. And he listed nine pages of "selected accomplishments."

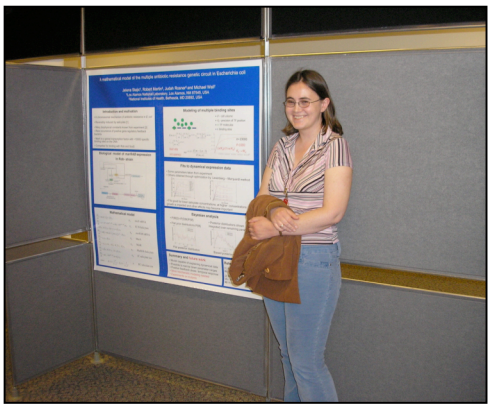
Subsequently, in keeping with past practice, division staff members presented several talks on May 2 and May 3 that served to profile approximately a third of the division's activities. (Presentations on the other two-third of CCS work had been presented in the two previous Division Reviews.)

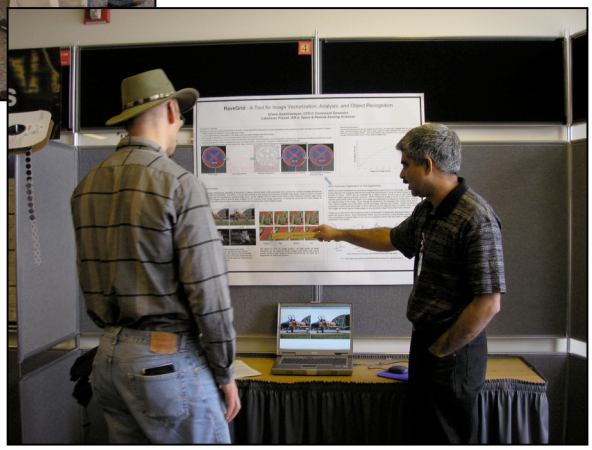
Ken Koch of the CCS Division Office and John Turner of Continuum Dynamics (CCS-2) spoke on "Heterogeneous Computing: Roadrunner and Algorithms." Ron Minnich of the Advanced Computing Laboratory (CCS-1) addressed the question "Why Are Clusters So Hard?" concluding, "They're not … unless we make them hard," and explaining his conclusion in humorous detail. James P. Smith of Discrete Simulation Sciences (CCS-5) spoke on "Science-Based Prediction in Threat Reduction Modeling and Simulation."

(Please see More DRC, on page 6.)

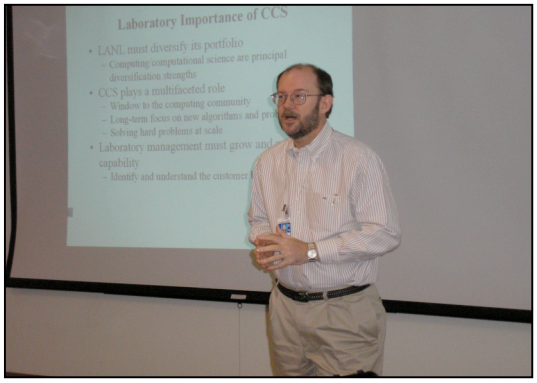
Division Review 2006

At top, left, Computer and Computational Sciences Division Leader Bill Feiereisen begins the open portion of the 2006 CCS Division Review with a summary. Above right, his audience includes group and deputy group leaders, members of the Division Review Committee, and a few interested staff members. Left, second photo down, Ron Minnich of CCS-1 is among the presenters. He makes his audience laugh—somewhat ruefully—in a talk about what we do that makes dealing with clusters so hard. Right, second photo down, breaks turn into an opportunity for informal but useful communication. Above, the audience listens intently.





Photos by Charmian Schaller



The 17 posters displayed during the Division Review were well received. At top left, Justin Tripp explains "Advanced Architectures" to a group that includes members of the Division Review Committee (DRC). At top right, a presenter stands ready to explain "A Mathematical Model of the Multiple Antibiotic Resistance Genetic Circuit in Escherichia Coli." At right, second from top, a presenter explains "RaveGrid" to Jeff Inman of CCN-12. At bottom left, participants reach out for a beautifully displayed feast. And at bottom right, DRC Chairman Daniel A. Reed wraps up the review—and compliments the division on consistently excellent work.

More DRC (Cont'd from p.3)

Robert Ecke, director of the Center for Nonlinear Studies, and Beth Wingate, CCS-2, spoke on "Science-Based Prediction in Fluid Dynamics." And Rich Graham, CCS-1, spoke on the topic, "Beyond MPI (Message Passing Interface): Thoughts on What Is Next for Application Communications."

On the afternoon of May 3, members of the review team visited all five CCS groups. Subsequently, on the last day of the conference (May 4), they commented on what they saw.

Steven Wallach, who visited CCS-1, noted that Science Appliance and Linux clusters are in wide use; field-programmable-gate-array (FPGA) explorations seem "promising and relevant"; and GPU (Graphics Processor Unit) computing is "important/relevant to heterogeneous computing."

Paul Woodward, who visited CCS-2, said it is the "A Team" for X Division algorithmic collaboration. He noted the interface treatments for code A; the use of mesh-free Lagrange techniques; and the "excellent work on turbulence for Climate Ocean Sea Ice Modeling and multimaterial mixing."

Ken Kennedy, who visited CCS-3 (Modeling, Algorithms, and Informatics), spoke of "continued world-class performance modeling effort"; "informatics projects directly relevant to homeland security"; and a "high success rates in competitive funding." (A quarter of the group's funding comes from Laboratory-Directed Research and Development funds. Another third comes from Work-for-Others money.)

Stuart Feldman, who visited CCS-4 (Transport Methods), noted "considerable transfer to working codes in X Division"; "reduced ray effects and increased efficiency in deterministic transport"; "improved memory utilization via domain decomposition"; and "improved focus on software process."

And Burton Smith, who visited CCS-5, pointed out "significant telecom modeling" ("the best U.S. data and modeling of important events"); "important results leading to public policy implications" (details on the spread of disease and how it can or cannot be slowed, for example); and "rapid response to urgent requests."

And a Poster Session Complete with Food

On May 3, early in the evening (4 p.m. until 6 p.m.), CCS sponsored a reception upstairs in the J. Robert Oppenheimer Study Center. Aramark, the Laboratory's food services contractor, set out an attractive and sumptuous assortment of dips, meats, cheeses, and fruits. In the adjacent room, a poster session provided a simultaneous feast of information.

Following is a list of all 17 posters and their presenters:

- "Open MPI and Open RTE," David Daniel, Tim Woodall, and Galen Shipman, CCS-1.
- "Advanced Architectures," Pat McCormick, Al McPherson, Nehal Desai, Justin Tripp, and Maya Gokhale, CCS-1.
- "The Application of Implicit Methods in Ocean Models," Wilbert Weijer, Balasubramanya Nadiga, CCS-2, and Henk Dijkstra (Institute for Marine and Atmospheric Research, Utrecht, the Netherlands).
- "RaveGrid: A Tool for Image Vectorization, Analysis, and Object Recognition," Sriram Swaninarayan, CCS-2, and Lakshman Prasad, Space and Remote Sensing Sciences Group (ISR-2).
- "General Purpose Computing on GPUs," Jamal Mohd-Yusof, Sriram Swaminarayan, and Sharen Cummins, CCS-2.
- "The LANS-alpha Model of Sub-grid Scale Turbulence in the POP Ocean Model," Mark Petersen, Matthew Hecht, Darryl Holm, and Beth Wingate, CCS-2.
- "On the Dynamics of Zonal Jets in the World Oceans," Balasubramanya Nadiga, CCS-2.
- "Performance Analysis of AmD's Dual-core Opteron," Greg Johnson, Mike Lang, and Darren Kerbyson, CCS-3.
- "Implicit AMR for Multi-scale, Multi-physics Problems," Michael Pernice and Bobby Phillip, CCS-3.
- "Transparent, Adaptive, Low-Overhead Fault Tolerance for High Performance Parallel Computers," Jose Carlos Sancho, Song Jiang, and Kei Davis, CCS-3.
- "Automatic Metadata Generation with Particle Swarms," Marko A. Rodriguez, CCS-3.
- "Identifying and Explaining Suspicious Instances in Semantic Networks," Shou-de Lin, CCS-3.
- "A Categorization Approach to Automated Ontological Proteian Function Annotation," Karin Vespoor, CCS-3.
- "Genome-Wide Discovery of Modulators of Transcriptional Interations in Human B Lymphocytes," Ilya Nemenman, CCS-3.
- "A Mathematical Model of the Multiple Antibiotic Resistance Genetic Circuit in Escherichia Coli," Jelena Stajic, CNLS, and Michael Wall, CCS-3.
- "Neutrino Transport in Proto-Neutron Stars," Kent Budge and Aimee Hungerford, CCS-4.
- "Characterization of Implicit Monte Carlo Projects," Tim Kelley, CCS-4.

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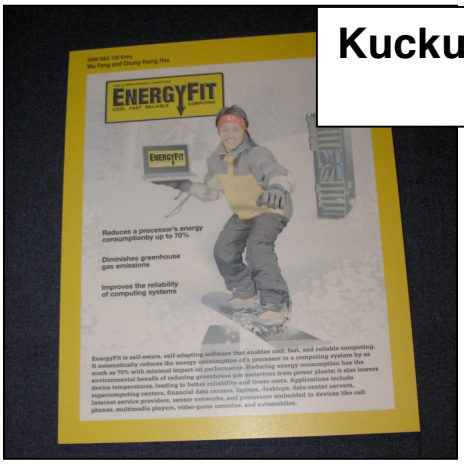
Kuckuck Reception Honors R&D100 Entries

CCS has four teams seeking awards



EnergyFit's cover—and all the other R&D 100 covers—are posted on the wall of the Bradbury Science Museum.

The four teams are: **EnergyFit**: Cool, Fast, Reliable Computing, entered by Wu-chun Feng (now at Virginia Tech) and Chung-Hsing Hsu; **ParaView**, a joint entry by Sandia National Laboratories and Los Alamos National Laboratory, for which the Los Alamos team members are James Ahrens, Kristi Brislawn, Lee Ankeny, John Patchett, Patrick McCormick, and Nehal Desai; **ReLocATE**: Reconfigurable Logic Accelerated Traffic Engine, entered by Maya B. Gokhale, Justin L. Tripp, Anders A. Hansson, and Matthew S. Nassr (plus Henning S. Mortveit, now at Virginia Tech); and **Trident**, entered by Justin L. Tripp, Kristopher D. Peterson, Jeffrey D. Poznanovic, Christine Ahrens, Neil J. Steiner, and Maya B. Gokhale.

Gokhale and CCS-1 Deputy Group Leader John Thorp proudly display four covers and multiple name tags.

Photos by Charmian Schaller

Hanson and Gokhale wait for the ReLocATE award.

New CCS-1 Group Leader Richard Graham peruses the program.

The Los Alamos ParaVue team members pose with Director Robert W. Kuckuck after receiving copies of their entry cover.

Meet Our New People

Ilya Nemenman

Ilya Nemenman, who joined the Modeling, Algorithms, and Informatics Group (CCS-3) on November 28, 2005, has a background that combines several fields.

Nemenman was born in Minsk, Belarus, and arrived in the United States in 1994.

He spent three years working toward a bachelor's degree at Belarussian State University, and then moved to Santa Clara University in Santa Clara, California, where he earned a bachelor's degree in physics and mathematics.

Subsequently, he earned a master's degree in physics at San Francisco State University, and in the year 2000, he earned a Ph.D. in biophysics from Princeton.

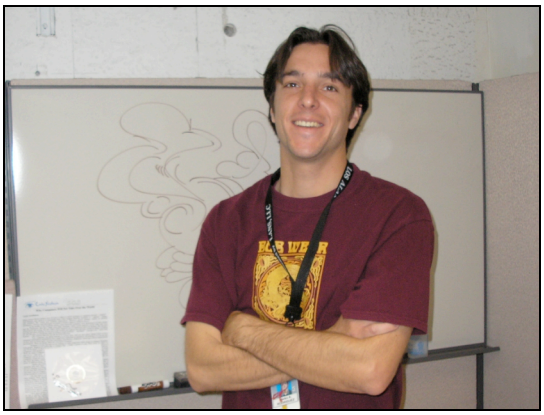
He moved next to a position as a postdoctoral researcher at the University of California-Santa Barbara Institute for Theoretical Physics. He also spent a year at Columbia Medical School, where he was a faculty member in computational biology before moving to CCS-3 as a technical staff member on the computational biology team.

He said that at CCS-3, he is working on two questions: Can we use computer science techniques to infer something from molecular biology experiments about the nature of the processes inside the cell? And how do biological systems compute? He said that the first question relates to machine learning, data mining, and informatics. Commenting on the second question, he said that many of the processes inside a cell can be viewed as an inference process. The cell views certain chemicals and decides, for example, whether it is an appropriate time to divide. Nemenman said, "Scientists have developed all the tools for signal processing and statistical inference, and that is what the cells are doing too—in a biochemically "noisy" environment.

Nemenman is working with Team Leader Mike Wall, CCS-3 Deputy Group Leader Frank Alexander, and Ingo Steinwart, also of CCS-3. He is also collaborating with Bill Hlavacek and Jim Faeder of T-10, and with Pat and Cliff Unkefer in B-3.

Asked what attracted him to the Laboratory, he said that he had considered coming in 2001 and in 2004 as a postdoctoral researcher, making contact with Mike Wall, among others. Eventually, when he decided he would rather not live in New York City, he called Wall and asked if CCS-3 could offer him a position as a staff member. When the answer was yes, Nemenman moved to Los Alamos.

Nemenman and his wife, Rimma, a statistician who grew up in Belarus and Israel, are now living in Santa Fe. Asked what his hobbies are, Nemenman said with a grin, "Home improvement. We just bought a house." He also enjoys scuba diving and mountaineering.



Marko A. Rodriguez

Marko A. Rodriguez, who joined the Modeling, Algorithms, and Informatics Group (CCS-3) at Los Alamos National Laboratory (LANL) in February, has a variety of intriguing specialties and interests.

He was born in Fairfield, California, and holds a bachelor's degree in cognitive science from the University of California-San Diego. He holds a master's degree in computer science from UC-Santa Cruz, and he is currently working on two doctoral degrees—one in computer science from UC-Santa Cruz, and one in philosophy from the Free University of Brussels, Belgium.

Prior to joining CCS-3, Rodriguez worked with Johan Bollen at the LANL Research Library for about eight months. His main focus at the Research Library involved the analysis of scholarly networks and algorithms to support the scholarly communication process—with a special focus on the peer-review process. His general area of interest is "the analysis of networks using particle swarms," he said.

Asked what first attracted him to the Laboratory, he said it was "a matter of data sets." The Research Library has a huge scholarly data set that he could explore and publish on. Furthermore, his advisor in Belgium, Francis Heylighen, had also been Bollen's advisor many years before, and it was through these connections that he heard about Bollen's work at LANL.

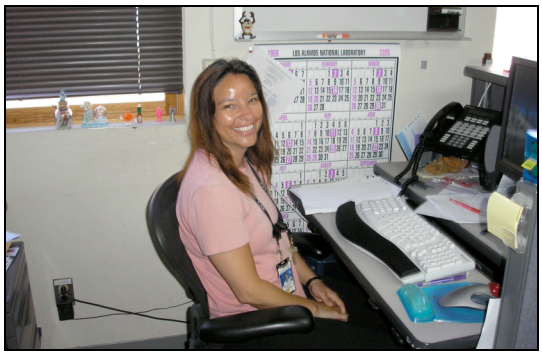
(Please see People, page 9)

People (Cont'd from p. 8)

Asked about his pursuit of a second Ph.D. in philosophy, he said, "I have an interest in the relationship between religion and entheogens."

He is exploring how these entheogens might have affected the development of religion and, from this vantage point, what effect means for interpretation of various religious scriptures.

Marko currently lives in Santa Fe, where, in his spare time, he is a pen-and-ink artist, producing large, abstract murals. He also plays in an "electronica rock" band.



Margaret Tyler

Margaret Tyler joined the Modeling, Algorithms, and Informatics Group (CCS-3) as group administrator on November 14, 2005.

In a recent interview, she said that CCS-3 is her third assignment since she joined the Laboratory in the year 2000. Her first assignment was at the White Rock Training Center. Subsequently, she worked in the Project Management Infrastructure Program (formerly Facility and Waste Operations or FWO).

She said that she saw the CCS-3 job online and decided to apply. "It was different from what I was doing," she said, "and it gave me an opportunity to learn other things within the Lab."

This is her first experience in the Technical Area 3 area, and she is finding it interesting to deal with technical people instead of construction workers. "It is *quite* different," she said. "I'm learning a lot, and the people are nice."

Tyler is a lifelong resident of the Jemez Springs area. She grew up in La Cueva and still lives there. Her husband, Ray Tyler, works in the Information Security Group (S-11). They have three children: Angela, 21, who lives in Albuquerque and is attending the Technical Vocational Institute there; and Xavier, 11, and their youngest, Jake, 8, both of whom attend Barranca Mesa Elementary School. **ΩΩΩ**

In Case You Missed It….

A May news release from the office of Sen. Pete Domenici, R-N.M., welcomed the launch at Los Alamos National Laboratory (LANL) of the first phase of the **Roadrunner** supercomputer program.

Domenici said, "Without underground testing, it is essential for our labs to simulate weapons designs and all modifications to ensure the safety and reliability of our nuclear deterrent. This is a cutting-edge technology that will give Los Alamos and the United States the first petaflop machine in the world." (A petaflop is one billion million computations per second.)

Domenici, chairman of the Senate Energy and Water Develop Appropriations Subcommittee, was instrumental in providing $35 million in fiscal year 2006 funding to begin the program. LANL, through the National Nuclear Security Administration, issued a request for proposals May 9 to begin phase one of the effort. The total cost of the computer is estimated at $90 million. The machine could eventually have two-petaflop capabilities.

James Ahrens of CCS-1 will be one of the invited speakers at the 2006 Scientific Discovery through Advanced Computing (SciDAC) Program, June 25-30 in Denver. His topic will be "Quantitative and Comparative Visualization Applied to Cosmological Simulations." Approximately 300 researchers are expected to attend.

Los Alamos National Laboratory has its first "**foreign nationals program coordinator**." Jim Nesmith reported for work on April 17.

He will serve as a liaison to foreign nationals and organizations that host foreign nationals; solve problems and resolve issues for foreign nationals and organizations that host foreign nationals; champion and execute initiatives to enhance the LANL environment for foreign nationals; coordinate input on issues affecting foreign nationals, and communicate concerns to management. He will be assigned in the Science and Technology Base Programs Division and will work in the Canyon School Complex.

Nesmith worked for the U.S. Immigration and Naturalization Service as an examiner and political asylum officer from 1982 to 1990. He worked at LANL for nine years as head of visitor and immigration services. And he served as international faculty counselor for Texas Tech from 1999 until this year. He holds a bachelor's degree in Japanese regional studies and a master's degree in business administration from the University of Washington. And he has studied seven languages—German, Thai, Japanese, Spanish, Polish, Russian, and his native language, English. **ΩΩΩ**

Security Tip: What should you do if you witness a violation of security policies? Workers **must** report all such violations to both their "responsible line manager (RLM)" and to the Security Inquiry Team (SIT, 665-3505).

Russians from VNIIEF

Participate in Computer Science & Computational Methods Workshop

At left, the Russians: Dmitri Kusnezov (in dark suit coat and red tie), Anatoly Vargin (light-colored jacket), Yury Bartenev, Sergey Sokolov, Igor Belyakov, and Rashit Shagaliev. The woman standing behind them is Larissa McMahan, one of two translators.

Below, the Americans: Bill Feiereisen, Mike Stevens, and Todd Urbatsch.

Left, second from top, Shagaliev speaks on "Numerical simulation methods of multidimensional problems of radiation and particle transfer in VNIIEF."

Right, second from top, Urbatsch explains how the Russians and the Americans will participate in a contest for locating code defects. The woman to his right is the other translator, Ella Grier.

At right, Cheryl Wampler describes "High-Performance Computing at LANL."

Photos by Charmian Schaller

Feiereisen Looks Ahead

He Wrote This Column During His Last Week as CCS Division Leader

As I write this, we are about a week away from contract transition. This next year will truly be a time of change, not only because of new management, but because of the changing business landscape in which we work. At the risk of endlessly repeating a cliche, "Times of change can be times of opportunity." We should take this to heart. This next year will be an opportunity to work with LANS' assistance on many problems that have seemed insurmountable up to now.

It's clear that weapons program funding is declining and that the Laboratory must diversify in order to prosper. LANS has stated goals of changing the balance of funding by increasing our other national security programs. We naturally think of the other federal agencies, such as the Department of Homeland Security and the Department of Defense as sponsors, but I believe that the new corporate aspect of LANS gives us an opportunity we have not had before. We will be a non-profit but private corporation and could think of partnerships with other commercial companies, even partnerships where they could fund us on work that would be of mutual benefit.

In CCS, this could mean partnerships with the large IT vendors of a different kind than the more traditional relations that we have had so far. We have had many traditional customer/supplier relationships—fee for service or fee for product—but this relationship could be turned around in such a way that we provide expertise or research to an IT company. CCS has had examples of this in the past, for example, the work on machine learning that we did in combination with a major bank and the Internal Revenue Service (IRS). Our Technology Transfer Office is advocating business development like this as evidenced by the recent agreements between a major oil company and another division.

Some possibilities for CCS come immediately to mind, both stemming from changes in the hardware that will soon be available to us. You're all aware that the first multi-core processors have appeared. The processor manufacturers say that we will have as many as 256 cores per chip in the next decade. Our natural reaction is, “Great! Let's increase the parallelism of our supercomputers and go to the next level of performance.” But traditional high-performance computing (HPC) is only a small market, and the chip manufacturers will not survive if the vast bulk of the commodity market has no need for more than one or two cores to run PowerPoint and Excel. So, what's the killer app? Well, I don't know, but I suspect that it will have to do with the human/computer interface and assistance in formulating very vague human requests into executable actions on the machine and then out to the network.

In the national security arena one can easily conceive of human/computer applications to searching databases, formulating inquiries, automated translation, voice recognition and machine learning that would clearly have spinoffs into commercial applications that businesses and individuals would want. Think back to Star Trek IV and picture Scotty attempting to talk to his computer through the mouse. Access to that computing power must be made available to those who don’t understand how to program or even what that means for commercial apps to command a market.

The computer infrastructure of multiple cores remains a parallel infrastructure. We still must make progress on machine models and programming environments that transform parallel programming from an arcane art practiced by a few to mainstream. These two thoughts go hand in hand. We look forward to multiple cores for our science apps, but scientific HPC is not large enough to drive the commodity market itself. We will see processors with many cores in our future if it’s economically meaningful for the chip companies to produce them. The chip companies will produce them if there are apps to run on them that the commodity market wants to run. And since these chips are fundamentally parallel machines, we are now back to the original problems of parallel computing … but with a much wider audience. Here’s an opportunity.

CCS is well positioned in the new organization. LANS has expressed a renewed commitment to HPC and recognizes that it underpins much of the science at the Lab. There is also a recognition that computer science research and development play a large role in the success of HPC and in the wider science supported by information technologies. I pledge to you that I will be working hard to help LANS put concrete actions on these stated directions.

Bill

Changes in Building 200

The crane and the crews that showed up recently at Building 200 are there for a very good reason. In a brief telephone interview, Building Superintendent Richard Strong said, "We're completely replacing the roof." He apologized for the smell and the noise, but he said that the work should be done by mid-June and will eliminate leaks that have been a problem for some time. ATC Associates Inc., a company with headquarters in Boston, Massachusetts, is doing the work. Strong said work crews are using a "cold kettle method" rather than the old hot tar method—a modern approach that reduces the smell somewhat. They are installing a membrane secured with lap adhesive. He said that once the roof work is finished, KSL's Low-Hazard Work Control Team will gear up to remove the "rain catchers" inside the building and replace stained ceiling tiles.

Photos by Charmian Schaller

Richard Fortson, left, and John Hogden, both of CCS-3, make good use of one of the new tables installed recently in **the patio** of Building 200. Several weeks ago, Frank Alexander, deputy group leader of CCS-3, included in his walk-around report the fact that time and windstorms had taken a heavy toll on the patio. Erika Maestas, CCS-3 staff assistant, sent a request to Footprints and followed up with reminders. The KSL Low-Hazard Work Control Team assessed the request and got the project moving. KSL carpenters built new furniture, and the KSL Ground Crew cut back the weeds. By the time the lilacs were in bloom, people in the building had a very inviting new space to share.